CMPT 280

Topic 14: Other Trees

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References

- Textbook, Chapter 14

Exercise 1

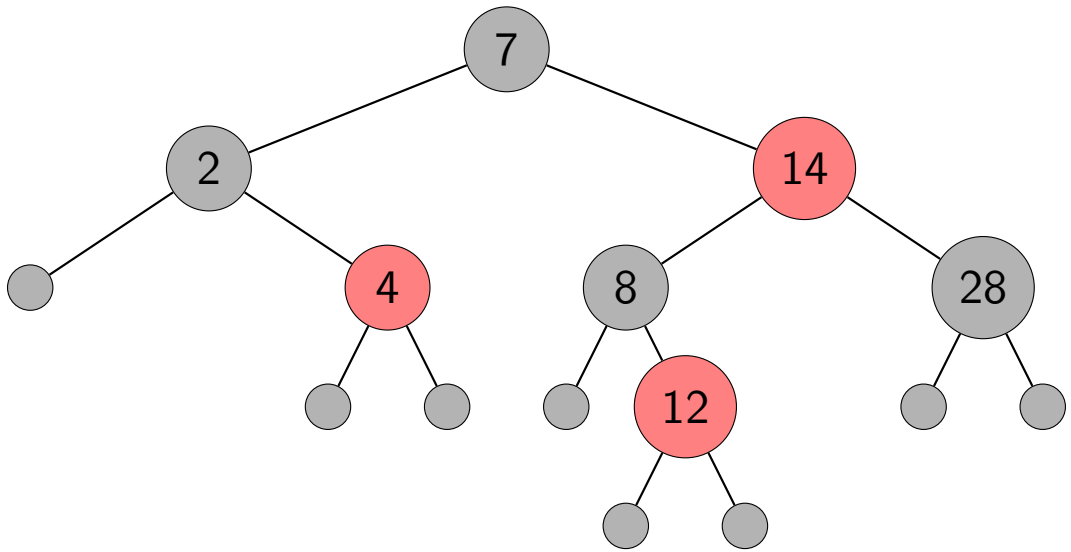
- B+ trees: generalization of 2-3 trees.
- B+ tree of order b – nodes have between $\lceil b/2 \rceil$ and b (root may have between 2 and b).
- Build a B+ tree of order 5 using the keys:
  20, 2, 7, 4, 14, 8, 12, 9, 17, 1, 18, 15, 3, 19,
  11, 10, 13, 6, 16

Exercise 2

- B-trees: generalizations of ordered binary trees.
- Node in B-trees of order n have between n and $2n$ children.
- Repeat exercise 1, but build a B-tree of order 3.

Red Black Trees

Here's an example of a red-black tree. Verify its properties.

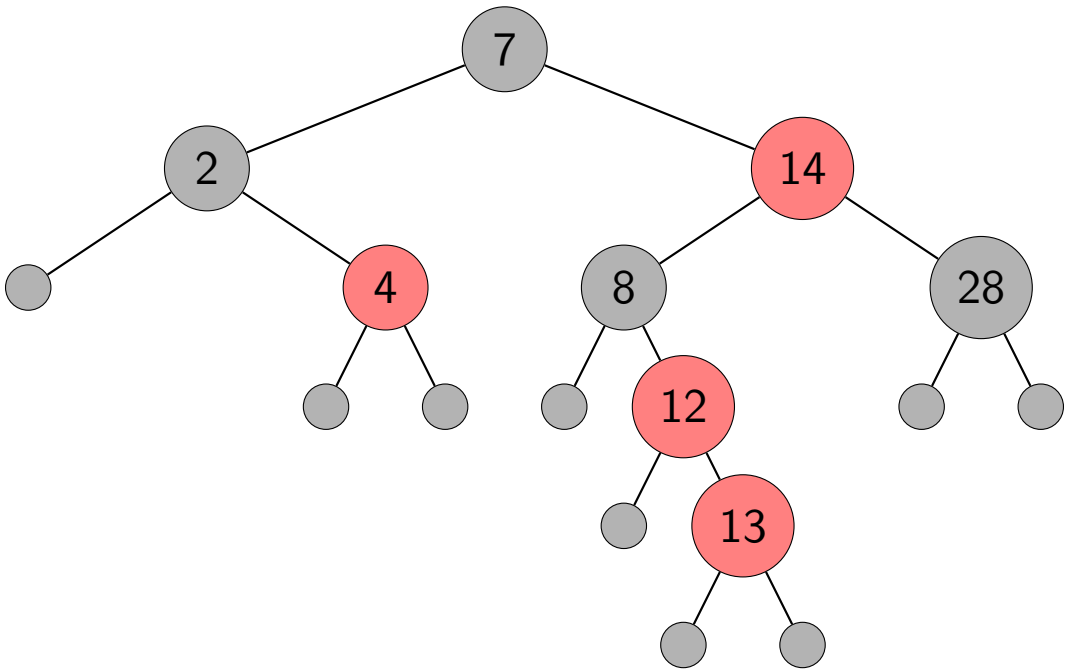


- Is it an ordered binary tree?
- Is root black? All leaf nodes are black?
- Every red node has 2 black child nodes?
- Every path from root to leaf has same number of black nodes?

Red Black Trees

A taste of insertion

Insert 13 – always insert a red node.

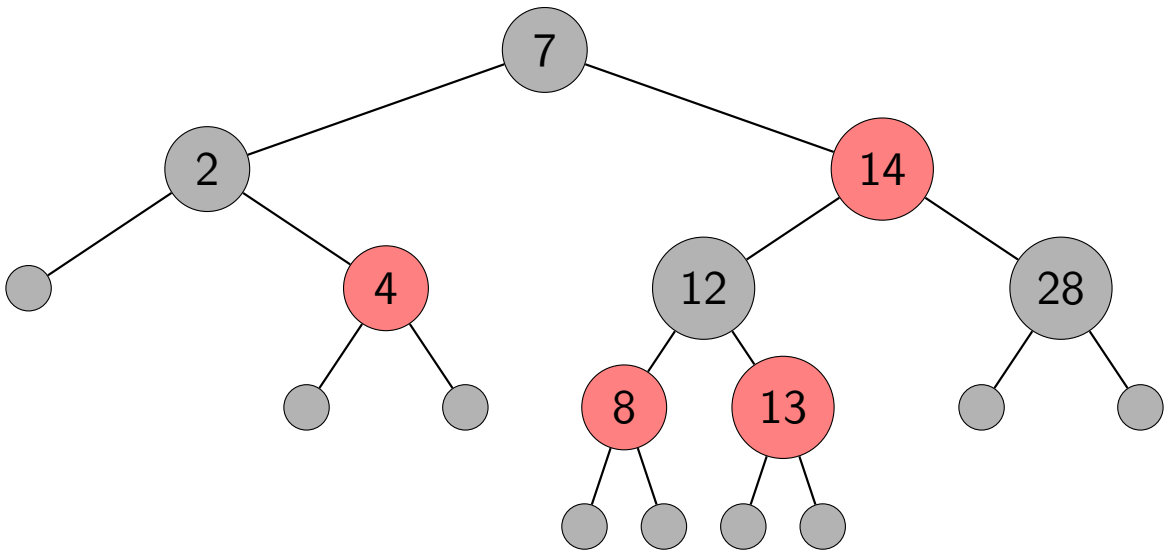


What properties are now violated? Since inserted node and its parent are both red, and the new node and parent node are both right children, a left rotation at 8 and a recolouring fixes the tree (this is one of **many** possible cases).

Red Black Trees

A taste of insertion

Insert 13 – always insert a red node.



Convince yourself that all properties now hold again.

Exercise 3

- Build a compact trie with the following integer keys: 42, 4423, 4221, 6140, 61, 819, 672, 4

Next Class

- Next class reading: Chapter 15: Graphs